ACARE

STRATEGIC RESEARCH AGENDA

Advisory Council for Aeronautics Research in Europe

October 2004

EXECUTIVE SUMMARY

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This is the 2nd edition of the Strategic Research Agenda that addresses the research needs of Europe in the field of air transport systems over the next 20 years. It sets out the likely directions of technological change that will need to be converted into specific research programmes over the coming years if the objectives of the work are to be realised. As the 2nd edition it builds on, updates, and widens the work done in the 1st edition published in October 2002.

The background to the Strategic Research Agenda was the work done on the seminal report on the future of air transport "Vision 2020" published in 2001. That report recommended the formation of an advisory body – since known as ACARE – to set out a series of agenda documents that progressively looked forward to give a long-term view of research priorities and needs. These agenda documents are intended to act as stimulating guidance to all those with an interest in the relevant research programmes, whether from a governmental, industrial, social, funding, policy or regulatory perspective. They do not comprise specific research programmes with lists of collaborating agencies but pave the way for them by setting directions and priorities.

Recalling the origin

Before summarising the structure and content of the Agenda it is appropriate to recall the overall objectives of the whole initiative, started in the late 1990s to bring a more coherent, long-term and inclusive view to bear upon future priorities.

The fundamental perception in the late 1990s was that air transport was a key part of the infrastructure that would support us in the 21st Century. Without it the future of Europe would be weaker, its place in the world slighter, its economic power diminished. All involved understood that there would be air transport of some form with or without any European attempt to take the long-term view. The issue was whether or not a laisse-faire system that was encouraged simply to grow as it wished, fragmented and incoherent, would be likely to serve the interests of Europe adequately. It was clear that one that had the benefits of coherence, system-wide thought and the involvement of all the key players in its future would be more likely to succeed. Air transport needed to be addressed strategically and coherently and not and in a tactical, fragmented way.

The objectives of this work have been European from the outset. The high level objectives are set out as the achievement of both (not either) society's needs and global leadership for Europe. These concepts have been subject to massive study in the course of the Agenda work and need to be enlarged slightly for their profound significance to be grasped.

Society's needs embrace the whole range of benefits that all citizens of Europe expect of the air transport industry now and in the future. These benefits are direct, as in the quality and price of travel, and indirect, as in the preservation of security and safety in a globalised world. They encompass the personal needs of travellers and the collective needs of non-travellers who want to live in quiet streets, safe from pollution. These same people must still benefit from the economic advantages of a thriving air transport system that allows businesses to operate, permits goods to flow, and generally lifts the prosperity of Europe.

So the second objective of economic leadership in the sector for Europe works hand in hand with the benefits to society. If Europe is to have economic benefits that will pay for social needs, whether or not related to air travel, then one of the engines of this prosperity is air transport. Taking the wider definition used in the Agenda that air transport includes manufacture, and the operations of airports, airlines and air traffic control together with all the regulations that control them, leadership for Europe is a massive concept. Very few regions in the world can aspire to belong to the leadership group that will set the direction and pace of development in this area. For many decades the clear leader has been the USA but now Europe outsells the US in airliners and has a population comparable to that of the US as its domestic arena. China, Japan or perhaps Russia and India may also seek to exert influence on this sector in the future.

Operating the air transport system at this leadership level means being able to have strong influence on the need for and detail of international regulation. It means having a critical mass of suppliers able to become expert and economic suppliers to the needs of the world, not just of Europe. It means having the means to balance priorities in a European context and not having to accept a European adaptation of international agreements largely forged by others. Finally it means securing and sustaining a balance of payments surplus that will feed money and technology into the wider economy. All of these advantages of economic progress and success have the ability to be harmonised with the social needs of Europe and, conversely, the social aspirations of Europe have a much smaller chance of being realised unless there is economic and competitive success in the world industry.

This connection is not because there is some necessary linkage with air transport, although this is the case in such areas as environment and noise, but because air transport is so big and such a powerful contributor to the economic architecture of Europe.

Against this backdrop ACARE has prepared this 2nd edition of the Agenda. It is built upon the technical foundations of air transport that relies for progress upon the application of science and technology. Without research and the creation of new ways of achieving ambitions there will be no progress. New problems, such as the determination not to allow world terrorism to halt or hinder development of travel, require new solutions and these in turn require new research and the development of systems. The growing concern for the environment points to the need for new research to understand the mechanisms that govern our complex global environment better than we do and then to develop solutions. The continued growth of globalised industrial trading requires that freight and passenger patterns are changing and new services are needed. Congestion of our fixed airport and air traffic management infrastructure is causing massive frustration to operations and passengers alike and needs new technologies and different ways of co-operating to overcome.

The agenda in summary

This Agenda is a complete and self-standing document although it does not repeat all of the points, still valid, that were made in the 1st edition.

Section 1 – Summary

Section 1 of the Agenda summarises the content and findings for a rapid assimilation of the main messages.

Section 2 – Preparation

Section 2 recalls the preparation of the second edition starting from the basics of SRA-1. It covers the underlying points on the macro-economic importance of the sector and the expectation of creating between 2 and 4 million additional jobs by 2020 and with a direct impact on up to 13% of Europe's future GDP. The section sets out other key figures for an understanding of the sector.

It continues with the history of the Agenda and the key findings of the 1st edition. It makes the point that the Agenda is not only concerned with direct technology programmes but also about the factors that will enable these to be productive and efficient. It also reports on activities since the 1st edition, the dissemination activities and the actions already taken by governments and industries to make use of the Agenda in their technology planning measures.

The work set in hand after edition 1 to create a better assessment of likely uncertainties in the future is set out in Section 2. This scenario work enabled three clearly different possibilities for the future to be identified in addition to the base-line scenario of the 1st edition. This was an important precursor to the 2nd edition and enabled the new Agenda to deal more effectively with possible futures and to consider the technology development implications of these. This work has been one of the main advances of this edition of the Agenda.

This is taken forward in the final part of the Section by the identification of the main advances needed and delivered by this edition. The objectives for the edition are set out and the section describes the notion of the High Level Target Concepts or HLTCs. These are extensions of the scenario work to create emphasis on particular characteristics coming from the scenarios. In the evolution of this concept five HLTCs were selected:

- The highly customer oriented air transport system
- The highly time efficient air transport system
- The highly cost efficient air transport system.
- The ultra green air transport system
- The ultra secure air transport system

Section 3 – High Level Target Concepts

The next Section 3 is in parts that correspond to these HLTCs and discusses each one in depth and is, in many senses, the heart of the Agenda where the technology issues are discussed. There is no sense in which one HLTC will be chosen in isolation or that technologies identified in one will not be appropriate in another but the concept allows the priorities of the technologies to be discussed and examined.

Section 3 also looks beyond the horizon of the HLTC's and is a useful extension of the concept into the further future. By looking towards the latter part of the century and examining possible developments it adds to the understanding of what technologies should be kept alive now, or even started so that these outlying possibilities will be supported with technology at the time.

Section 4 – Implications

Section 4 brings the HLTCs into focus in considering an integrated view of their implications across the whole air transport system. It considers the issues as Business, Policy, Process or Technology and it is here that the wider implications of the Agenda are discussed as a whole.

In the assessment part of the Section the Agenda addresses the institutional and public implications of the work. The scope for public decisions to influence the progress of the Agenda is great. It ranges from investments in facilities, co-operation in the construction of new facilities, research co-operation, education as well as in many aspects of public policy for qualification and mobility of researchers and, indeed, in their broader availability.

The final part of this section deals with the resource and efficiency implications of the Agenda. The overall need is for the technical issues identified by the Agenda to receive more effective research. Some of this increment of progress can be delivered by greater efficiency in the research processes and the means of doing so are identified. Notwithstanding this there is a need for substantially more funding, about 65% more, to be applied from public and private sources if the issues facing the sector are to be properly addressed.

Key findings

1. SRA-1 has been a success and this has contributed to SRA-2, not only in the confidence that ACARE has had in extending the scope but in the feedback that ACARE has had from SRA-1. SRA-1 has been adopted as **the** reference for a number of national and institutional bodies that have established their research programme using it as a guide e.g. FP6, French and German National Programmes, EUROCONTROL and an increasing number of industry stakeholders. This is helping with the transparency of programmes and with collaboration. As this process develops we expect to move on to using the Agenda to improve the efficiency of the research process and to highlight those activities that are most value-adding and also those which are duplicative for no good reason. The Agenda will give a strong, common background for this.

2. Wealth generator – Air transport is in itself a significant contributor to European wealth. The resultant benefit is spread across all Member States, either as a result of its direct contribution (2.6% GDP and 3 million jobs) or, even more importantly, as a consequence of its lubrication effect on all modern economies enabling our life-style and the way we do business. Its total contribution to the economy is estimated in excess of 10% of GDP.

3. The Agenda is more robust – This edition of the Agenda reflects alternative socio-economic scenarios and their associated technologies in the holistic approach advocated by ACARE and it is thus more robust than SRA 1. It also provides an indication as to the importance of each separate technology and the timescale of its importance. It presents important new planning aids to research programmers.

4. European research needs more money – re-analysis has shown that, taking an encompassing view of the research needed and the necessarily associated facilities and demonstrators, about 65% more funding is now required over the 20 year forward view than is presently being invested. Whilst this expenditure is not evenly paced there is clearly an urgent need to see a reversal in the trend to decreasing amounts of research funding assigned to air transport research at national level.

5. European research needs more people – The Industry may face a shortage of skilled young people in the future, partly due to demographics and partly due to the reduced attractiveness of the aerospace business as it may be perceived by young people. Future graduates will need additional skill sets most notably in multi-disciplinary approach, excellent communication skills, open mindedness and cultural awareness.

6. Research needs to be more efficient – The research funds used across Europe must be better co-ordinated with less duplication of work that has no justification for being conducted. This could perhaps start with areas of common societal interest (safety, security, environment, ATM). Some examples of progress are already evident such as the joint action between EUROCONTROL and the EC.

7. Implementation monitoring – The Observation Platform is launched – it will provide a snapshot of current status, trend over time and together will guide and inform future research programmes and will facilitate better co-ordination.

8. Money alone is not enough – The creation and funding of research programmes will be to no avail unless European companies are encouraged to retain their European bases and to conduct their own research in Europe. In addition to the work outlined in the Agenda a number of policy actions are needed to ensure that the entire community involved in the aircraft and air transport sectors sustain a coherent and stable future. Part of this policy challenge is to ensure that the competition between major regions is recognised as a major factor in the development of industrial plans. Stability will be encouraged by equality of treatment both inside and outside of Europe.

9. Action is required by each Member State if the full contribution of their own industry is to be fully exploited.

Next steps

Many of the actions expressed in this Agenda need to be monitored and encouraged among the nations and the other stakeholders of the EU. ACARE will continue to act as the disseminator, proposer and general promoter of the Agenda as the standard point of reference for all aeronautically related research work across the Community. These actions for ACARE are almost self-evident in its role.

There is, however, a set of even more challenging actions that ACARE wishes to accept and to meet. ACARE perceives that important actions need to be addressed during the next 2-3 years in the following areas:

- Member States should designate the Air Transportation System and the relevant industry and research institutions as a distinct national priority and/or enabler for economic growth.
- Encouraging more debate, and research, about the impact of aviation on the atmosphere and to plan the environmental controls of the long-range future.
- Pressing the nations, the EU, airports, airlines and the ATM community to address the new business models that will be necessary in the future.
- Promoting more international debate about the far-term consequences for and of the aviation transport world.
- Facilitating links between the Member States and their collaboration on matters of aviation research within the framework of the Agenda.
- Proposing actions that will lead to the establishment of a European repository of aviation knowledge and act as a centre for new studies of the issues that are outlined in the Agenda.
- Integrating representatives from the new Member States into the framework of ACARE and together with them strengthening the Agenda with their new knowledge, experience and capabilities.
- Each Member State should review how its own industry can be facilitated to develop to its full potential.

Only with ACARE taking an active, unified role within the wider community can the benefits of the research programme outlined in this Agenda be brought to deliver the Top Level Objectives of Vision 2020.

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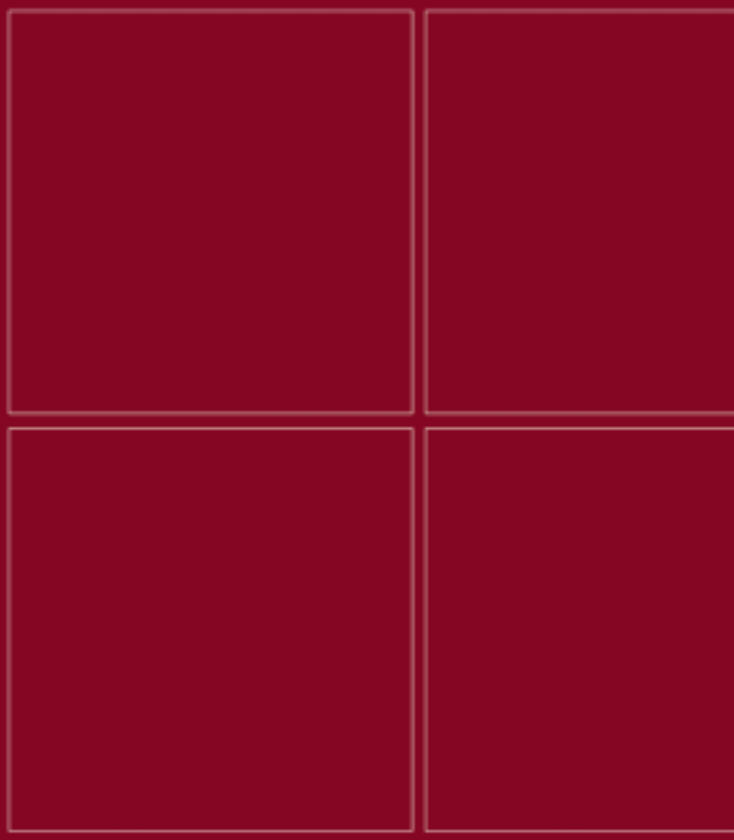

For further information

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